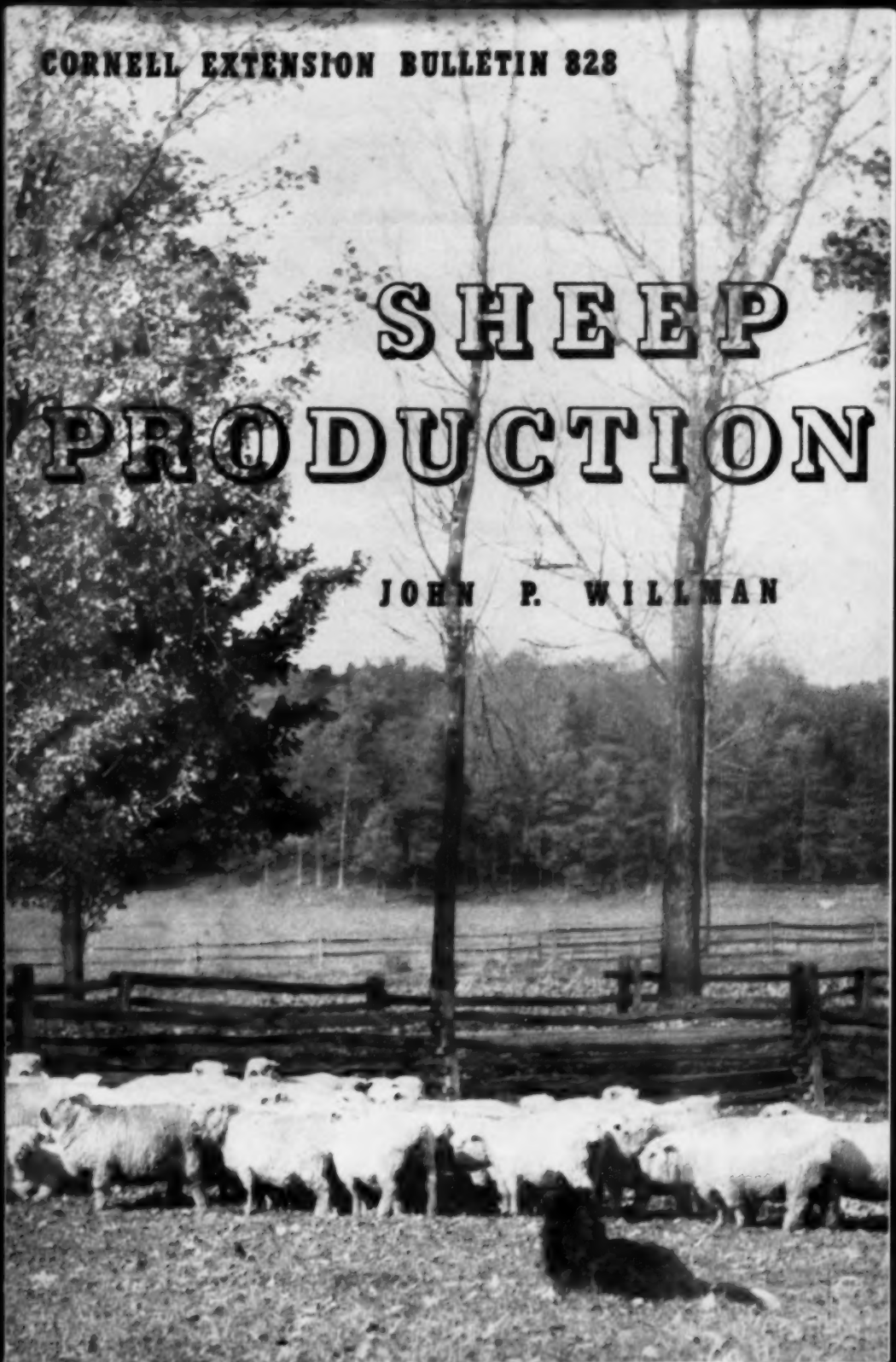
CORNELL EXTENSION BULLETIN 828

SHEEP PRODUCTION

JOHN P. WILLMAN



A publication of the
New York State College of Agriculture,
a unit of the State University of New York,
at Cornell University

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Sheep Production

JOHN P. WILLMAN

MANY changes have come about in the extent and type of sheep husbandry in this State since the early part of the nineteenth century. In the early days and up until twenty-five or more years ago the Merino, a breed of the fine-wool type, was popular. Today breeders raise sheep chiefly for the meat, but the income from the wool crop is of considerable importance. They make a definite effort also to improve the quality and amount of wool produced by their sheep. New York State wool is in strong demand and represents only a small part of that used by the woolen mills within the State. There are excellent markets in New York State for fat market lambs and sheep.

New York, A Leading Breeder of Purebred Sheep

NEW YORK ranks high in the number of breeders of purebred registered sheep. There are a number of breeders of purebred Corriedale, Cheviot, Dorset, Shropshire, Hampshire, Suffolk, Oxford, and Southdown sheep. Tunis, Columbia, Rambouillet, Merino, Lincoln, Leicester, Cotswold, Black-faced Highland, and Karakul breeds also are raised in the State. New York's purebred flocks are highly regarded from coast to coast and have been a source of breeding stock for other sections of the United States and Canada.

Possibilities of Sheep Raising

NEW YORK is well suited for sheep production. Large areas that cannot be used profitably for other agricultural purposes would furnish excellent grazing land for sheep.

The length of the grazing season varies from one section to another. Usually a flock may find good grazing for about six months or more annually. The temperatures are favorable for sheep, and in general the distribution of rainfall is satisfactory. Most of the grazing areas are amply supplied with water. New York is truly a grassland area. In addition, large areas in the State are well adapted to the production of legume or mixed grass and legume hays which are suited to sheep production.

AUTHOR'S ACKNOWLEDGMENT. George R. Johnson, Associate Professor in Animal Husbandry, gave valuable assistance in the revision of this bulletin, which was formerly Cornell Extension Bulletin 399.

The population of the State buys much of the lamb and mutton produced in the United States; a strong demand exists for a high-grade product that can be and is being produced by a number of Empire State farmers. At present many live lambs are shipped into this State annually to be slaughtered. According to the Market News Branch, Livestock Division, Agricultural Marketing Service, United States Department of Agriculture, more lambs and mutton were killed under federal inspection during 1954 in the New York area (New York City, Jersey City, and Newark districts) than were received as western dressed receipts in the New York area (New York City, Jersey City and Hoboken). There are good markets in many sections of the State for fat lambs that are raised here and also for the western lambs that are shipped East to be fattened and sold when they reach market weight and finish.

New Flock Owners

MANY persons who would like to raise sheep hesitate to establish a flock because they know so little about them. Those who have established flocks of sheep with the help of other sheepmen, the state and county Extension workers, and the suggestions found in bulletins or books, have found sheep production both interesting and profitable. Others have failed because of improper feeding and management and of failure to prevent losses in the flock from internal parasites.

To many persons, sheep are mysterious animals. Because they are small and covered with wool, sheep are difficult to observe. Furthermore, they are not individually fed and handled, except for a brief period at lambing time. The experienced shepherd has developed his power of observation and is quick to see the behavior of certain sheep in his flock. Much information can be had in print, but the real knowledge of the sheep business usually is acquired only by actually working with the flock. The care of sheep is neither hard nor tedious.

The farmer who understands sheep, likes them, and enjoys working with them will be successful. If he treats them as scavengers, he surely cannot expect maximum returns. Sheep require less attention than hogs or dairy cattle, but it is important to give them this care or attention at the proper time.

One of the most serious handicaps for the beginner is the lack of woven-wire fences. The initial cost of sheep fences is high, but properly built woven-wire fences are not so costly in the long run as are those of barbed wire especially when the barbed wire is used to enclose cattle and sheep. An excellent sheep fence is made of woven wire 39 inches high, with one or two barbed wires above it to protect it from damage by cattle or horses. A better fence is made of woven wire 4 feet high, with one barbed wire above. Well-

built, 6-strand barbed wire fences are good fences for cattle and sheep.

Dogs are a serious handicap to sheep production in some areas. Fortunately, New York State has a law that permits the quarantine of dogs in troublesome areas and also provides for payment of indemnities to owners of sheep or other livestock that are killed or injured by dogs. Flock owners who have trouble from dogs should contact without delay the assessor and the local dog warden.

A few farmers do not keep sheep because they believe that cattle do not like to graze where sheep have been pastured. Pasture experts say, however, that in the British Isles it is a common practice to allow cattle and sheep to graze together. New York flock owners who have run sheep and cattle together seem to like this practice. These two classes of livestock make more efficient use of pasture than either one of them alone. There should, of course, be enough feed for both.

Sheep are truly grazing animals and give best performance when they have adequate or abundant pastures. Successful sheepmen know that sheep may prefer one pasture more than another even though these areas may be equally green in color and similar in appearance at least from a distance. Sheep thrive on many of the submarginal hill farms in this State when they should have access to a large enough area to furnish the feed they need. Experienced shepherds are better able to judge the value of various pasture areas than are beginners. *Good pastures may furnish enough feed per acre for five or six ewes and their lambs while poor pastures may carry only one or two ewes and their lambs per acre.*

Photograph from H. E. Babcock

Figure 1. Sheep prefer high ground
The sheep leave their droppings here on the high ground where fertility is needed

Sheep Have Advantages

HEALTHY, well-managed and well-fed flocks are able to produce a large proportion of fat lambs at weaning time. Other classes of livestock require considerably greater quantities of grain to produce a finished product. In addition, sheep are able to graze and do well on land that is unfit for the plow or because its location or topography is not suited for grazing by other animals. *Pastures that are wet or poorly drained are not good for sheep.* Losses from internal parasites are usually greatest on low-lying, wet, or swampy land.

The sheep has often been referred to as the animal with the golden hoof. No doubt this is due to the manner in which sheep distribute their droppings over the land and trample them into the soil thus causing little waste. Grazing sheep, owing to their preference for high ground, leave much of their droppings where they are most needed.

Sheep are excellent weed destroyers and it is claimed that they eat a greater variety of plants than do other livestock. Because of the construction of their lips, they are able to pick up grain lost at harvest time in stubble fields and are able to graze closer than are other animals. They do a splendid job of cleaning up the fence rows when turned into lanes or newly mown fields.

Sheep are ruminants and therefore are physiologically adapted to the utilization of relatively large amounts of pasture and roughage as compared with the amounts of grain. Studies[1] show that sheep utilize about 13.6 acres of pastures and forages to each acre of grain; whereas, beef cattle use 4.8 acres of pastures and forages to each acre of grain, and hogs use only 0.2 acre of pastures and forages to an acre of grain. To use this acreage to advantage, sheep must be in good health, and the pastures and forages must have certain characteristics.

The income from wool and lambs or mutton usually comes at different seasons of the year. Wool may be stored and thus held for high prices.

Sheep do not require expensive buildings and equipment. If the lambs are born in late spring, only a shed or an inexpensive barn is needed. The chief requirements are for shelter from the wind and the snow or rain and a clean, dry place to lie down.

Kinds of Sheep Production

Commercial Farm Flock

The commercial farm flock, the most common type of sheep enterprise in this State, usually consists of from 30 to 50 ewes, but numerous flocks consist of from 100 to as many as 700 or more ewes. The time of year when the ewes are bred to lamb and the type of production followed varies widely. The ewes in these

[1] *Sheep Science*. By William Garfield Kammlade. J. B. Lippincott Co. Chapter 23, pps. 159-160. 1947.

commercial flocks are usually grades or crossbreds, but they are mated with purebred rams.

Early Lambs

Flock owners whose lambs come in January, February, or early March provide warmer barns and feed more grain to the ewes and to the lambs than do those who produce the later lambs. These early lambs are marketed in the spring and summer and usually sell for higher prices than the lambs that are marketed in the fall. This kind of lamb should weigh 70 pounds or more, and should be fat enough to be marketed before June 15 to bring the best prices. This type of production is more specialized than the production of late lambs and enables the farmer to keep more ewes on a given area, because few of the lambs need pasture during the summer.

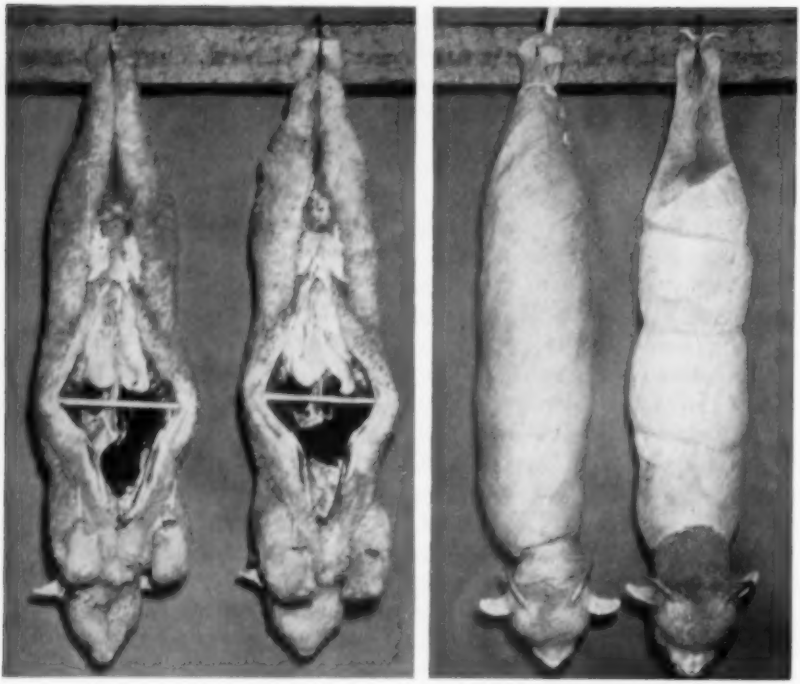
Late Lambs

The majority of flock owners in New York prefer to breed their ewes so they lamb during April and May. This type of production enables the sheep breeder to make maximum use of temporary and permanent pasture and does not require the use of expensive buildings and equipment. Many of these lambs are finished on grass or forage crops and are sent to market in the fall. Those light in weight and not fat enough to be marketed are fed grain after they are weaned and are allowed to graze or are put into the feed lots until they are fat enough. Late lambs usually are marketed between October 1 and January 15. Fat market lambs that weigh from 80 to 90 pounds are preferred.

"Hot-house" Lambs

The production of "hot-house" lambs is highly specialized and requires a definite kind of ewe flock, good barns, careful shepherding, and liberal grain feeding. A "hot-house" lamb is born between September 1 and January 1. In many flocks a number of lambs born after January 1 reach a large enough size to be sold as hot-house lambs for the eastern markets. Hot-house lambs are slaughtered when they weigh from 40 to 45 pounds live weight and range from six to ten weeks of age. The lambs are dressed with the head and pelt on and with the heart, lungs, liver, spleen, and kidneys remaining in the body. Before they are bled, a strip of wool, about 4 inches wide, should be shorn off of the underline of "hot-house" lambs running from the lower jaw to the tail or dock.

Lambs with live weights of from 40 to 45 pounds yield carcasses that weigh from 28 to 32 pounds. Most of the dressed lambs are shipped to the New York City markets by truck or rail. A good, hot-house-lamb carcass sells for as much as a 100-pound live, fat, market lamb. The Delaine-Merino, Rambouillet, Dorset, and Tunis ewes, or grades and crosses of these breeds, are best suited for this kind of production because they



A B

Figure 2. "Hot-house" lamb carcassses

A. The lambs are slaughtered when they are fat and weigh from 40 to 45 pounds live weight

B. The carcasses are first wrapped with paper and cheesecloth or with some other similar material (right) and then are wrapped with burlap (left). In warm weather the ice made by freezing 1 pint to 1 quart of water in rubber balloons may be put in the chest cavity of each carcass to prevent spoilage.

breed early enough to produce this "off-season" lamb. One of the best ewes for this purpose is the crossbred Dorset-Merino. When these are mated with a low-set, compact, thick, blocky, and heavily fleshed ram, they produce lambs that yield beautiful carcasses. Hot-house lamb production requires more work in the winter months and has certain other advantages, but only those who have had considerable experience with sheep should engage in this type of production. Producers who live near the markets have a little advantage in marketing "hot-house" lambs.

Purebred Flocks

Purebred flocks vary in size and are handled in much the same manner as commercial farm flocks. The lambs are born as early as is practi-

cal and the lambs and ewes are liberally fed. The better ewe lambs are saved to be sold as breeders or kept for replacements in the flock. The best ram lambs are saved and sold for breeding purposes, usually as yearlings, while the remaining lambs are sold for slaughter.

Commercial Lamb Feeding

Feeding lambs during fall and winter is an important enterprise in the western part of the State. Many farmers in that section feed from 300 to 350 head of lambs annually but others may feed as many as from 2000 to 3000 head. A double-deck carload consists of about 300 to 350 head of lambs.

Usually, farmers feed western lambs but a few farmers feed native lambs. Some feeder lambs weigh from 40 to 55 pounds; others weigh as much as from 65 to 80 pounds when purchased. When they reach a feed-lot weight of about 90 pounds, they should be fat and ready for market. Final average feed-lot weights of from 95 to 100 pounds or more have been common during recent years.

Lamb feeding gives the farmer a favorable distribution of labor throughout the year and utilizes barns or sheds that otherwise would be idle; it also enables him to market his grain, roughage, and bedding through these lambs at a better price than he could obtain otherwise. Some feeders buy a considerable portion of the grains or concentrates needed, but during recent years they have been growing nearly all of their grain. Since most of them are cash-crop producers, they prize highly the manure that is produced through these feeding operations. Fat lambs are sold on the Buffalo market, or are shipped to Jersey City or other eastern markets, or are sold to local

Figure 3. Western feeder lambs

The lambs are fed for three or four months and are marketed when they are fat and weigh from 85 to 95 pounds

butchers. Many lambs and sheep are sold at auction markets in the State.

Well-fed, healthy, feeder lambs should gain at the rate of from 0.30 to 0.40 pound daily. The average daily ration for the entire feeding period consists of about 1.10 to 1.30 pounds of grain and concentrates and about 1.60 to 1.70 pounds of good legume hay or its equivalent. At first only a small amount of grain and concentrates is fed, but it is increased to as much as 1.5 or 1.8 pounds daily or even slightly more toward the end of the feeding period. Hay is full-fed at all times when the lambs are fed in dry lot. Corn silage, pea silage, or grass silage also may be fed in place of part of the hay.

Lamb feeding is an important business. Probably it is a less speculative enterprise for those who feed lambs every year than are many other agricultural enterprises. A number of New York State lamb feeders have fed either native or western lambs for 25 to 50 years.

Types, Classes, and Breeds of Sheep

The more common and better known breeds of sheep may be grouped into two types: the *fine-wool type* and the *mutton type*. The mutton type may be further sub-divided into the *medium-wool* and the *long-wool* classes.

The Fine-wool Type

The fine-wool type of sheep produces a shorter fleece than most of the mutton type. The individual wool fibers are much finer and smaller in

Classification of sheep according to type

Fine-wool type	Fine-wool breeds	Rambouillet Delaine-Merino American-Merino
Mutton type	Long-wool breeds	Lincoln Leicester Cotswold Romney Marsh Black-faced Highland
	Medium-wool breeds	Southdown Shropshire Hampshire Suffolk Oxford Tunis Cheviot Dorset Corriedale Columbia Targhee Romeldale Panama
Fur type		Karakul

diameter and the annual yield of grease wool to the sheep, with few exceptions, is much greater than for the breeds of the mutton type. The American Merinos (A and B types) are decidedly lacking in mutton conformation and are of little economic importance today. The modern, smooth bodied, C type-Merino or Delaine-Merino and the Rambouillet have better mutton qualities than was common a few years ago. In general, the fine-wool sheep are more angular in conformation than sheep of mutton type.

The Mutton Type

Sheep of the mutton type have been bred and selected for their ability to produce both lamb and mutton economically. Wool production, however, has not been overlooked because the wool is of considerable value. The *long-wool* breeds produce much longer fleeces, the individual fibers of which are larger in cross section than those found in fleeces produced by the *medium-wool* breeds. The Corriedale and Columbia breeds are listed as medium-wool breeds but could also be listed as *crossbred–wool-type* sheep. They were developed by crossing the fine-wool and long-wool breeds of sheep. The Panama, Romeldale, and Targhee, raised chiefly in the Far West, also may be considered as crossbred–wool-type breeds.

The Fur Type

The fur type is represented by the Karakul breed, from which the pelts from very young Karakul lambs are sold for fur garments. The older lambs of this breed may be slaughtered for food and the wool produced by the breeding flock may be used by manufacturers.

The more common breeds of sheep are classified according to type on page 12.

The Nature of Sheep

Sheep are somewhat timid by nature and, in general, are defenseless. They are easily frightened; and it is best to handle them quietly. Some persons believe that sheep with horns are able to protect themselves against dogs, but experience has shown that few, if any, sheep are a match for a large dog, whether that dog is destructive or merely playful.

It has been said that "a sick sheep is as good as a dead sheep." There may be some truth in this statement, but successful producers know that much can be done to prevent death if treatment is begun early enough. It is difficult for beginners to observe when a sheep is slightly ill, and as a result treatment may not be started until the animal is so sick that little can be done to help it.

Gregariousness

Sheep are gregarious by nature. The Merino and Rambouillet breeds and their grades have the flocking instinct developed to the greatest degree, and the Cheviot and Black-faced Highland breeds to the least

The Rambouillet is especially popular in the range-sheep States. This breed is a heavy producer of wool and, although a fine-wool breed, has more mutton qualities and is larger than the other fine-wool breeds. The Rambouillet has white color markings and flesh colored lips and nostrils. The ewes are hornless. Most of the rams have horns but there are some polled strains in this breed

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Photograph from The Sheep and Goat Raiser

Figure 4. Rambouillet ram

The C type, or Delaine-Merino, is more free from folds or wrinkles and more desirable in mutton type than the A and B type Merinos. The color markings are the same as the Rambouillet. The Merino is a small sheep and, like the Rambouillet, is noted for its flocking instinct. The ewes are without horns.

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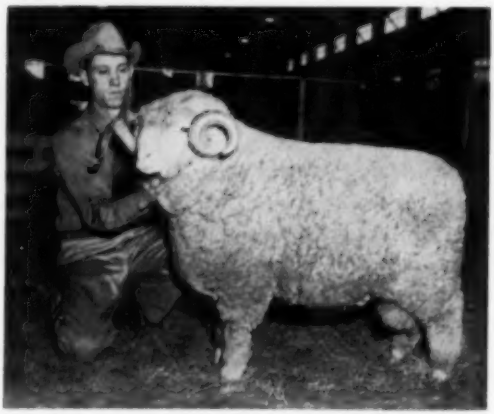
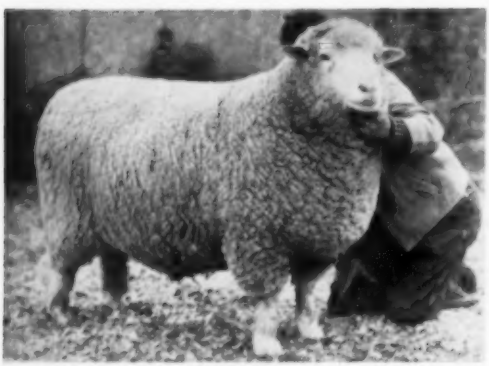


Photograph from The Sheep and Goat Raiser

Figure 5. Delaine-Merino ram



The Columbia is a large breed with an open face and has white hair on the face and legs. Both sexes are hornless and are heavy wool producers. The breed was developed in this country since 1912 and is popular in the Range States and in certain other areas.

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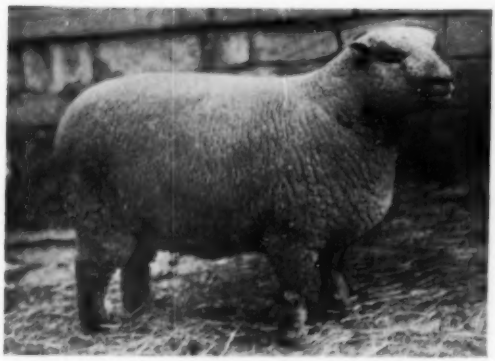
Figure 6. Columbia ram

The Cotswold carries her head high and the ears usually are inclined upward. The wool is long and lustrous, and the sheep is almost as large as the Lincoln but larger than the Leicester. The lips and nostrils are black, the hoofs dark, and the face and legs either white or white mixed with gray

Figure 7. Cotswold ewe



The Southdown, a medium to small breed of sheep, is often referred to as being ideal in mutton type. The color of the face and legs is preferably a light mouse-brown. The lambs usually are fat at lighter weights than are the lambs of larger breeds

Figure 8. Southdown ewe

The Shropshire is larger than the Southdown and is of the mutton type. The head and legs of typical specimens are well covered with wool, and the color of the face ranges from deep soft brown to black

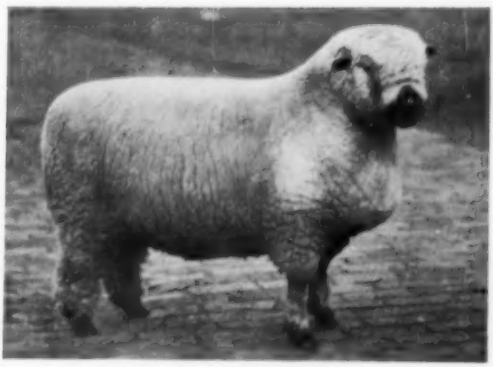


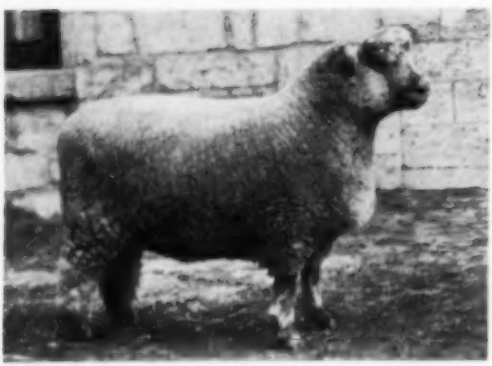
Figure 9. Shropshire ewe

The Hampshire is a larger sheep than the Shropshire. There is a moderate extension of wool over the head and on the legs. The ears are larger and the markings are more black than those of the Shropshire. The Hampshire is popular in the range-sheep States as well as in the farm-flock States.

Figure 10. Hampshire ram

The Suffolk is fully as large as the Hampshire. She has no wool on the head in front of the ears and the legs below the hocks and knees are free from wool. The color markings are black. This breed is gaining in popularity throughout the country

Figure 11. Suffolk ewe



The Oxford is one of the largest of the medium-wool breeds and is a heavy wool producer. There is a moderate extension of wool on the face and legs and a marked tuft of wool on the forehead. The color markings range from a brownish gray to a deep dark brown

Figure 12. Oxford ewe

The Cheviot is a small breed and especially well adapted to grazing on rough, hilly pastures. The ears are erect and there is no wool on the head and ears nor on the legs below the knees and hocks. The lips, nostrils, and hoofs are dark, but the face and legs should be white. A few small dark spots are sometimes found on the ears and face, but red or sandy-colored hair on the head or legs is objectionable

Figure 13. Cheviot ram

The Dorset is a medium-sized breed. Unlike other common mutton breeds, both sexes have horns. The face, legs, hoofs, and fleece are white, while the nostrils and lips are flesh colored. They cross well with the finewool breeds. The Dorset will breed out of season and is noted for its milking qualities.

Figure 14. Dorset ewe

The Corriedale is a medium-sized breed and has white color markings. The breed is well known for its heavy wool production, and is gaining in popularity in this country. The face, ears, and legs are covered with white hair, but dark or black lips, nostrils, and hooves are preferred.

Figure 15. Corriedale ram

extent. Sheep prefer high and dry ground and in favorable weather prefer to be out of doors. The younger sheep seem to prefer higher ground than the older members of the flock. Even two- or three-week-old lambs enjoy getting onto the backs of their mothers while the ewes are lying in the pen, or they may spend considerable time on top of a box or a bale of straw if these are placed in the pen.

Need for Water

Sheep can go for longer periods without water than can other classes of farm animals. Perhaps they obtain a considerable amount of their water from grazing when the dew is on the grass. It is cruelty, however, to force them to go without water when it is possible to keep it before them without too much effort. They drink from 1 to 4 quarts daily. They should not be forced to drink stagnant water.

Eat a Variety of Feeds

Sheep eat a wide variety of grasses and weeds, but prefer the shorter and newer growths of grasses and herbage. When properly managed, they derive much of their winter feed from browse available in the pasture land of many areas in this State. Sheep eat various kinds of dry roughage but prefer legume hay and also hay that was cut at an early stage of maturity. They like silage or other succulent feeds and roots. It is not necessary to grind small grains for healthy sheep, but it may be desirable to grind, crush, or crack these for old sheep and for lambs under five weeks of age.

Breeding Habits

Sheep generally come in heat and will breed in the fall or early winter, usually from August or September to January. The Merino, Rambouillet, Tunis, and Dorset, and their grades or crosses, may breed in the spring and produce lambs "out of season" in the fall. The Dorset is well known as a producer of fall lambs. Ewes of a few other breeds also breed early enough to drop lambs in late fall. Most sheep drop their lambs in the late winter or spring.

Some variation is shown in the length of time a ewe remains in heat. The usual duration of the heat period is from a few hours to nearly 2 days. If not bred, heat will recur in 16 or 17 days; but the number of days between the heat periods may vary considerably. The gestation period may range from 142 to 152 days, with the average of about 146 days.

Two Crops of Lambs a Year

It is possible for some ewes to drop two crops of lambs in one year but experienced shepherds know that one good crop a year is enough for most sheep. A ewe that drops a lamb in the fall, but loses it before it is old enough to wean, may be bred again to produce a lamb the following spring.

When Is a Sheep Old?

Sheep vary as to age at maturity and length of life. The medium-wool breeds mature more quickly than the fine-wool breeds, but the fine-wool breeds reach a much older age. As a rule, a sheep is considered old at six or seven years, but many exceptional sheep have been known to live until they were twelve or more years old. The length of life is influenced greatly by the feed and care they receive.

The Selection of the Flock

Adaptability

Too often a ewe flock is purchased without enough consideration to the conditions under which they will be kept or the type of production to be followed. This is particularly true when a purebred flock is being established. It is also true to some extent in commercial flocks when the owner intends to save his own ewe lambs for replacements.

It is important to select the type of sheep best adapted to the conditions on the farm. Many types and breeds are available, and certain of these are better suited for one set of conditions than for others. A large breed cannot be expected to do so well as a small breed on rough, hilly pasture lands. The larger breed is not well adapted to travel on the steeper hillsides, and needs more feed than these pastures usually produce. It is true that the lambs of the larger breeds may grow faster than those of the smaller breeds; but because of the scarcity of feed, the ewe produces less milk than she would on the better pastures on level or gently rolling lands, and consequently the lambs are not fat at weaning time. The lambs from the larger breeds not only need much milk but also need luxuriant pasture to enable them to be fat when they reach the desirable market weight of about 90 pounds. A thin lamb of this weight does not meet with favor on the market.

The author has seen many purebred sheep considerably smaller than the average of the breed, even though they were descendants of large sheep, because the pastures were too rough and hilly and the vegetation too sparse to insure normal development. It pays to select medium-sized ewes for the farms that do not provide excellent pasture and larger ewes when the grazing land is level and the feed abundant. Most successful sheepmen do not like ewes that are smaller than the average for the breed.

To establish commercial flocks, one may have to buy ewes that are not ideal in size or conformation. These deficiencies, however, may be made up by the use of the proper kind of rams. The producers of quality lambs select rams that will correct the deficiencies of the ewe flock. *Often the best lambs at weaning time are produced by mating low-set, thick, and compact rams to larger, more leggy, and long-bodied ewes.*

Some sheep, especially the fine-

wool breeds, are noted for their ability to travel long distances, for their flocking instinct, and for their hardiness. On the other hand, the Black-faced Highland and the Cheviot are hardy but are independent grazers and lack the flocking instinct. Some breeds, especially those of the medium-wool class, are much more prolific than the fine-wool breeds. Such breeds as the Dorset, Suffolk, Oxford, and Hampshire are heavier milk producers than many other breeds. Great differences also exist between breeds in both quantity and quality of wool produced.

When and Where to Buy

The best time to establish or to increase the size of a farm flock is in the summer or early fall when a large supply of ewes is available and when prices are lower than at other seasons.

Purebred sheep should be selected from the flocks of successful breeders. Persons interested in establishing commercial flocks consisting of grade ewes may obtain native ewes locally, or may buy ewes that are raised in the range country of the Far West. Many flock owners in New York State do not save any ewe lambs for replacements but buy western yearling ewes when they wish to replace their ewes or to increase the size of their flocks. The native ewes are more desirable in mutton conformation, but may be badly infected with parasites. Uniform lots of native ewes are not available except in small numbers. The western ewes are reasonably free from internal parasites and it is possible to obtain large flocks of them that are uniform in type, breeding, age, size, and fleece. The white-faced western ewes commonly are of grade fine-wool type and breeding, or are a cross between fine-wool type ewes and long-wool or crossbred-wool type rams. They are very hardy but may not be so prolific as the native ewes. It is possible to buy black-faced western ewes which are the result of mating black-faced rams, usually Hampshires or Suffolks, with white-faced ewes. Western ewes may be bought through commission firms, from dealers, or from producers in the West.

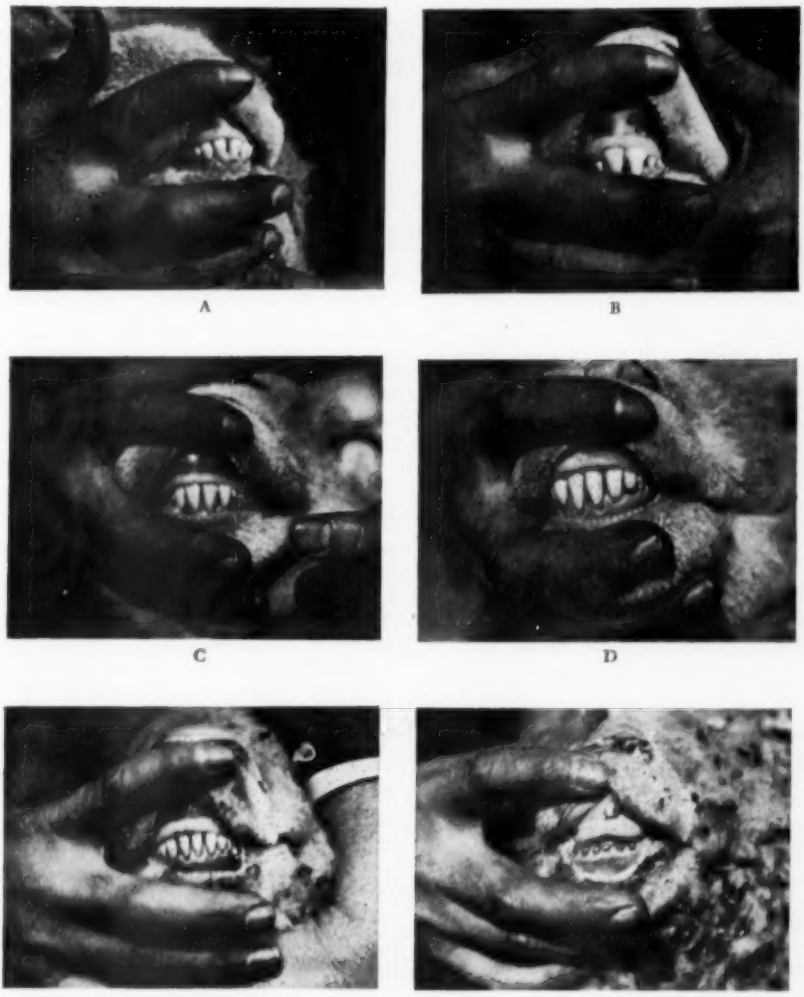
Number of Ewes

The flock that consists of only 25 or fewer ewes is apt to be neglected, and the overhead charges for use of rams is high. A flock of from 40 to 50 ewes is a more satisfactory unit where sheep are the minor enterprise on the farm. The carrying capacity of the farm and the amount of available shed or barn space usually limit the size of the flock on farms where sheep are not a major enterprise. Small flocks are best for beginners in the sheep business.

Kind of Ewes to Buy

Age

It is desirable to start the flock with well-grown yearling ewes. Two- or three-year-old ewes may lamb more easily than yearlings, but few flock owners wish to sell their best two- or three-year-old ewes. Occasionally small numbers of four- to six-year-old



Photograph from Kansas Agricultural Experiment Station

Figure 16.

A, Teeth of a lamb; B, teeth of a yearling showing the first pair of permanent incisors; C, teeth of a two-year-old; D, teeth of a three-year-old; E, teeth of a four-year old, a full mouth; F, a broken mouth of an old sheep

ewes are available that may be a profitable investment for owners of small flocks. Such ewes may not do well when run in large flocks but they may raise excellent lambs when they have the care and attention they need. Such ewes should be bought at a lower cost than the younger ones.

Teeth an indication of age

The normal lamb has four pairs of temporary incisors in the lower jaw. The middle pair of these is replaced by a larger and permanent pair of incisors when the sheep is about one year of age. The next pair is replaced by permanent teeth the following year and so on until the last pair, the fourth or corner pair, are in full wear when the sheep is approximately four years old. The time at which these teeth come in varies with different breeds. The condition of the teeth is an indication of maturity rather than the exact years or months of age. As the sheep get older, the teeth become long and narrow, and seem to spread apart. Finally they break off, thus producing what is known as a "broken-mouth." When all of the incisors have disappeared, the sheep is known as a "gummer." The age at which this condition exists depends to a great extent upon the kind of grazing land on which the sheep are kept. Many sheep have broken mouths at six years of age when forced to graze on sandy soils, while those that graze on good pasture grown on heavy soils may have sound mouths at seven or eight years of age.

Value of ewes

Farmers who have owned commercial flocks for many years have suggested, as a general rule, that yearling grade ewes are worth in dollars no more than the total cash value of their first crops of lambs and wool.

Defects to be avoided

Defects common to many sheep which should be avoided are: *long or crooked legs, narrow chests, long necks, shallow bodies, weak backs, and drooping or peaked rumps.* Broken or imperfect mouths and bad udders should be avoided when selecting aged ewes. Usually the udder is sound on yearling ewes; rarely, however, a teat has been badly cut when the ewe was shorn so that it will not function at lambing time. The udder of aged ewes should be soft, pliable, and free from bunches or lumps and the teat free from obstructions. Lame or sore-footed sheep should not be bought because they may spread foot rot through the entire flock.

Heavy shearing ewes should be preferred. The skins should be pink and the fleeces free from dark fibers. Over-fat ewes may be shy-breeders, and very thin ewes may be "wormy." There is no better time to buy a mature ewe than when her lamb is about three or four months old and is running with her. At this time, the value of the ewe as a producer can be determined by comparing her lamb or lambs with others in the flock.

The Ram Is Half the Flock

Purebred rams sire more uniform crops of lambs than grade or scrub rams. Often a well-chosen purebred ram pays back in the increased value of his first lamb crop more than his cost above that of a grade. The ewe transmits her characteristics, desirable or not, to only one or two lambs a year, but the ram transmits his characteristics to every lamb he sires. Hence the saying, "The ram is half of the flock."

Because the ram is half of the flock, a great deal of care should be exercised in his selection. Too many flock owners buy a ram because he is nearby, because he is large, or because the price is right. The farsighted shepherd looks for a ram months before he will need him and when a number are available from which to choose. He knows the defects in his ewe flock and attempts to buy a ram that is strong where the ewes are weak.

Selection of Ewe Lambs for Replacement

The most successful breeders of sheep give careful consideration to the selection of ewe lambs to be saved for breeding purposes. Those saved for replacement should be selected from the heaviest milking, most prolific, heaviest shearing, and best individual ewes in the flock. The older, better developed, twin-ewe lambs are preferred by many breeders. The selection of such ewe lambs of his own breeding enables the breeder to develop an unusually productive flock. Judicious selection, however, cannot

Figure 17. A purebred Hampshire flock grazing on afterfeed on a meadow from which an excellent crop of first cutting hay was harvested. There are many purebred flocks of this sort on New York farms

be satisfactorily made without the aid of simple flock records.

Some commercial flock owners prefer to purchase western yearling ewes or ewe lambs for replacement or to increase the size of the flock. They may be able to buy ewes for less money than they can raise similar ewes.

The Breeding Season

The Time to Breed

The time to breed is determined by the type of production followed. "Hot-house"-lamb producers may start breeding as early as April 15, while the producers of early winter lambs do not commence breeding until August or September. The owners who prefer to have their lambs come during the latter part of April or in May do not turn the rams with the ewes until about December 1.

Ewe lambs should not produce their first lambs before they are one year of age. Well-fed and well-grown ewe lambs may be bred when they are 8 or 12 months old. Purebred breeders and many grade flock owners have found that it usually is best to have the ewes produce their first offspring when about two years of age.

Flushing the Ewe Flock

Because the ewes are apt to be thin in flesh after having raised a lamb, they should be fed liberally for a period of at least two weeks before the beginning of the breeding season. The practice of giving more feed at this season is known as "flushing." When the ewes are bred during the grazing season, they may be "flushed" by allowing them access to better pastures or temporary forage crops, or by giving them a small amount of home-grown grains, usually from ¼ to ⅔ pound for each ewe daily. A similar increase in grain offered is recommended for the flock that does not have access to pasture. The addition of cabbage, pumpkins, roots, or any other such feed will accomplish the same result. This increase in feed is usually continued for at least one month after the ram is turned with the ewes or until a large percentage of the ewes are bred.

Sheepmen believe that "flushing" increases the number of twins produced. Ewes are more apt to come in heat and to become pregnant after the first service when they are in a good, thrifty, and gaining condition during the breeding season. Every shepherd should be interested in a large lambing percentage and also in a short lambing season. When the lambing season is short, a more uniform lamb crop is insured.

Experience has shown that a large percentage of lambs saved and raised to weaning age results in larger returns from the flock. Single lambs may be preferred in a few cases, especially in very large flocks, but usually owners of commercial flocks are interested in a high lambing percentage. The owners of large flocks should strive to raise at least a 100

per cent lamb crop while the percentage should be greater for small flocks.

Preparation of Rams and Ewes for Mating

If the ram has been purchased a few weeks before the beginning of the breeding season, the shepherd can have him gaining in condition before he is turned with the ewe flock. The ram that has been given regular exercise before the beginning of the breeding season is able to give a better account of himself than one that has been kept penned up in the barn. Whenever practical, a small amount of grain should be fed during the breeding season, especially when heavy service is desired. When the ram is in too high condition, he may be uncertain as a breeder for the first few weeks that he is allowed to run with the ewes.

If the ram is carrying a heavy fleece, he should be shorn if the weather is favorable or at least some of the wool should be removed from his neck, breast, belly, and scrotum. It is considered good practice to clip some of the wool from the dock and from around the vulva of the ewes before the beginning of the breeding season. Shepherds often clip the wool rather closely over the dock and rump of over-fat ewes, or ewes that are inclined to be fat over the rump. This practice makes mating easier for the ram.

Painting the ram's breast

Too often the rams are turned with the ewes and the owner has little or no idea whether the ram is settling them. It may pay to paint the floor of the chest of the ram once every day or two during the breeding season with some coloring material so that he will leave a mark on the rump of the ewe that he breeds. This marking paint may be made into a paste by mixing ordinary lubricating oil with yellow ochre, venetian red, lamp black, or other coloring material. Linseed oil should not be used in preparing this material because it will harden on the wool and thus lower its sale value.

After the ram has been with the flock for 16 or 17 days, the color should be changed. It is recommended that yellow be used during the first 16-day period, red during the second period, and black during the third period. When this is done, the owner knows whether or not the ewes are settled at the first, second, or third service and also when to expect them to lamb. If all the ewes are rebred, the owner knows that the ram is either an uncertain breeder or a non-breeder, and he will have an opportunity to use a new ram and still raise a crop of lambs. This precaution of marking the ram takes only a little time, but eliminates a lot of guess work and sometimes prevents disappointment and financial loss. Some rams apparently unable to settle the ewes in July or August may be effective later in the season.

Methods of Mating

The common practice is to allow the ram to run in the field with the

ewes during the breeding season. This method is satisfactory for most flocks, but when either a ram lamb or an old ram is used, or when a large number of ewes are to be bred, then it is best to allow the ram to run with them only at night. He may be kept in the barn during the day where he will have an opportunity to feed and rest. If he is especially nervous, he is more apt to rest and to feed as he should if a few ewes which are not in heat are placed with him during the day time. This rest period is especially desirable during hot weather.

When allowed to run with the flock, yearling or two-year-old rams may be expected to serve 40 or 50 ewes during the breeding season. The general use of ram lambs should be discouraged, but a well-grown ram lamb, if properly fed and handled, may be bred to 12 or 15 ewes without impairing his future usefulness. Rams are able to breed a greater number of ewes when they are allowed to run with them only at night and still more when the "hand-coupling" method is followed.

The "hand-coupling" method requires that a "teaser" ram be allowed to run with the flock to determine which ewes are in heat. The "teaser" is equipped with an apron of canvas or heavy burlap. This is fastened close to his underline and extends from his front to his rear legs, to prevent actual mating. The floor of his chest is kept painted with a suitable marking material and as soon as he marks a ewe she may be removed from the pen and mated with another ram. This method makes possible the use of a ram on twice as many ewes as he could successfully serve if he were allowed to run with the flock.

If the flock owner does not object to unusually late lambs, then he may wish to allow his ram to run with the ewe flock for two or three months after the beginning of the breeding season. This practice has proved beneficial to the ram because he will get more exercise than if he were removed and kept in limited quarters. Bossy or rough rams are apt to injure the ewes, especially at feeding time, and should be removed at the end of the normal breeding season.

Feed and Care of Pregnant Ewes

Feeding the Ewe Flock

Even though the conditioning of the pregnant ewes is essentially somewhat of a fattening process, they should not be allowed to become too fat. Most of the ewes should be in about the same state of flesh rather than for some to be fat and others thin at lambing time. A uniform condition can be obtained more easily if the ewes are sorted in lots according to their condition. Even in small flocks, a few ewes are usually much thinner than others and these should be separated from the others so they may be fed more liberally. Many of the ewes which are thin in the fall are those that have done the best job of raising lambs during the previous summer. They should not be penalized, but should be rewarded for hav-

ing worked so hard for their owner. After this sorting has been done, the careful shepherd handles his ewes along the top line occasionally throughout the feeding period to determine their condition. He may find that further sorting may be necessary.

Ewes bred for "hot-house"-lamb production or for the production of early lambs obtain much of their feed from pasture during the period of pregnancy. As the period of pregnancy progresses, it is best to move such ewes to better pasture to furnish them the feed they need. When good pastures are not available, the ewes should be fed some grain or concentrates. Ewes may make especially good use of additional roughages when the pastures become short and dry.

Roughages

A breeding ewe consumes from 600 to 700 pounds of good-quality legume hay during the average New York State winter. About 2½ pounds of corn silage or grass silage may be substituted for 1 pound of hay. The total amount of roughage needed varies according to its quality, the condition or size of the ewe, and the length of the winter season.

Every shepherd should be interested in feeding his ewes economical rations and also should be interested in feeding rations that will tend to produce strong and vigorous lambs. Sheep are noted for their ability to utilize waste products, and in winter help the farmer to utilize much feed that would not find a ready market. They enable the farmer to utilize on the farm much home-grown roughage of good quality and not only pay him a return for it, but also save him the baling charges. Sheep will consume large quantities of cull beans, unsalable cabbage, bean straw or bean pods, oat or wheat straw, corn stover, corn fodder, and the like. For best results, however, in addition to these, they should be fed some alfalfa, clover, soybean, or other legume hays and some grains or concentrates. Silage or roots are valuable additions. Sheep will eat early-cut timothy hay or grass hay, but it is best to feed this or other carbonaceous roughages only once daily, and then give them good legume hay at the other feed.

Sheep have been successfully wintered on corn silage as the sole roughage. When, however, it is necessary to do this, they should be offered in addition, for each sheep, about ½ ounce or slightly more of ground limestone daily, and at least ¼ pound of linseed meal, cottonseed meal, soybean oil meal, or soybeans. It is best to feed a ration consisting of both silage and legume hay and enough grain to bring the ewes into proper condition. A ration of 2 or 3 pounds of silage and all the legume hay she will eat makes an ideal feed for the bred ewe if she is healthy and in reasonably good condition. Four or 5 pounds of roots or cabbage for each ewe daily may be substituted for the silage. Great care should be exercised to keep moldy or spoiled silage from the ewes; decayed parts of roots should be carefully trimmed off be-

fore they are cut and fed; also, it pays to trim off the outer leaves of cabbage that has been dusted with poison for the control of cabbage worms.

How much should a ewe gain?

One is occasionally asked the question, "How many pounds, live weight, should the average-sized ewe gain during the winter months?" As a general rule, a flock of ewes which are in thin to medium condition and which average 120 pounds in weight, when they are brought into the barn during the latter part of November, should weigh from 140 to 160 pounds at the beginning of the lambing season the next spring. No harm will come if some of the ewes gain more than this, but a gain smaller than 20 pounds on such ewes is not recommended. Sometimes a group of young, healthy ewes which are bred in November or December are able to make the necessary gains during the winter if given access to excellent-quality legume hay. If the same ewes had been bred in September, without a doubt they would need in addition some grain or concentrates to be in proper condition at lambing time. *Usually about ½ pound or more of grain should be fed for six or eight weeks before lambing,* but the exact amount needed and the length of time it should be fed should be determined by the condition of the ewes. The various grains and concentrates and suggested concentrate mixtures for sheep are given on pages 46 to 50.

Exercise

A flock of ewes of good mutton type should have regular exercise throughout the period of pregnancy. Well-bred ewes of mutton type may become too fat and produce weak lambs when they are fed too liberally and are kept in the barn during the entire winter-feeding period. On the other hand, ewes with a high proportion of fine-wool blood may be liberally fed and may also be confined to their pens throughout the winter-feeding period without unfavorable results.

Floor and rack space[2]

The ewes should not have to crowd through narrow doorways, to jump over high door sills, or to crowd at the feed trough. Small ewes need at least 12 square feet of floor space, and large ewes about 18 square feet of floor space, in the barn. Space for feed troughs and hayracks should range according to the size of the ewes, from 12 to 18 inches each.

Water, salt, and minerals

Seldom is it necessary to feed the ewe flock any minerals except salt. Salt should be available to them at all times. The experience of thousands of flock owners has shown that the sheep and lambs get all the salt they need when they have access to a mix-

[2]Plans for the construction of useful sheep buildings and equipment are given in Farmers' Bulletin 810, published by the United States Department of Agriculture, Washington, D.C.

Photograph from Van Vleet Brother

Figure 18. Exercise in winter
Most flock owners prefer to give the ewe flock exercise throughout the winter

ture of 1 pound of phenothiazine and 9 pounds of salt as the only source of salt.

When non-leguminous roughages are fed, it is best to feed a calcium supplement, such as ground limestone. Some flock owners prefer to feed a certain amount of this calcium supplement daily, as has been previously suggested (page 27), while others prefer to give them access not only to salt in a salt box or in a trough, but also to a mixture of salt and ground limestone or bone meal. Where flock owners have suffered losses in new-born lambs due to goiter, it is advisable to feed iodine to the pregnant ewes, preferably in the form of iodized salt.

It is much better to keep water before them in tubs, pails, or low watering troughs than it is to force them to travel a long distance to a creek for their water supply. The latter method is satisfactory in favorable weather, but in cold and stormy weather it is better to have the water supply in the barn.

At Lambing Time

Getting ready for lambing

As lambing time approaches, the shepherd should get things in readiness for the new arrivals. The pens and equipment should be put in order and the ewe flock should be prepared for lambing. If the ewes have not been shorn, it is advisable to trim the wool from their docks and to remove the loose and dirty wool tags from sides and rear. For a few ewes it may be necessary to remove a small

amount of wool from around each teat to enable the lambs to nurse more easily.

Feed before lambing

The ewe flock just before lambing time should be well fed but not forced to eat very coarse hay or roughage that is low in feeding value. The feeding of poor-quality roughage, very bulky rations, or a reduction in the amount of grain fed within a few weeks of lambing time may produce "pregnancy disease," or "before-lambing paralysis" as it is sometimes called. It is important that the ration be somewhat laxative in nature. When silage or roots are not included in the ration, a little wheat bran or linseed meal should be included at this time in the grain or concentrate mixture.

Care of the ewe at lambing

Every shepherd should look upon lambing time as a harvest season. He should realize that the effects of the care of the ewe flock during pregnancy will then become evident; and he will be rewarded for the extra care and attention that he may give the flock. He should not be such a heavy sleeper that he may fail to make the necessary trips to the barn to help the ewes and the newborn lambs if they need assistance.

Most ewes will lamb with little or no assistance, especially when they have been fed and managed properly during pregnancy. The careful shepherd, however, will be on hand to render assistance, because he knows that under the best of conditions, some of the ewes may need help; or they may disown their lambs. A few of the lambs may be weak at birth or, in cold weather, may become chilled. Immediate attention is then necessary to prevent losses. Experience shows that a large proportion of lambs saved and raised to weaning age means a larger return from the flock.

Many ewes exhibit characteristic symptoms as lambing time approaches. Usually the ewe has a sunken appearance on each side of her rump and the udder becomes filled and the teats distended. She is restless, will get up and lie down repeatedly, and may paw at the bedding immediately before lambing. The beginner is apt to become excited and may wish to give the ewe assistance before she is ready for this help. When assistance is given, every precaution should be taken to prevent injuring the ewe. The finger nails should be trimmed, the arm thoroughly washed with mild soap and water, and the hand and arm greased with mineral oil or vaseline before entering her to straighten out a lamb that is being presented improperly. The normal presentation is with the fore feet and legs extended and the head between them or resting on them. The posterior presentation, both rear legs coming first, is a satisfactory one. If the shepherd gives aid, he should pull down and out in the general direction of the hocks. It is best to pull only when the ewe labors.

Care of the lamb at birth

As soon as the lamb is breathing, his navel cord should be immersed in tincture of iodine to prevent the possibility of navel ill, or infection of the navel. Now and then a lamb may appear lifeless at birth. Quick action then is necessary to prevent losses. The shepherd should remove the mucous from the mouth and nostrils, and then by slapping the lamb on both sides of the body just back of the shoulders or by rubbing it briskly with a handful of straw or a burlap bag, he usually is able to get it to breathe.

A strong and vigorous lamb usually has no trouble feeding itself soon after birth, but a weak lamb may perish when it does not get assistance at this critical period. A weak lamb should be held up to the udder of the ewe and, if necessary, a little milk may be forced into his mouth. Sometimes it is easier to get the lamb to nurse during the first few hours of his life if occasionally the ewe is laid on her side and rump so the lamb has less difficulty finding the teat. In extreme cases it may be necessary to draw a little of the first milk from the udder of the ewe and to feed it to the lamb with the aid of an eye dropper or teaspoon.

Examine the udder of the ewe

Every careful shepherd examines the udder of the ewe to see that the teat canals are open and that the wool around the udder does not hinder the lamb when nursing. It is not enough to examine the udder only when the lamb is born, but it should be examined for several days after birth to learn whether the lamb is taking all of the milk. It is good practice to milk out a certain portion of the milk daily from the udders of the heaviest milking ewes in the flock, at least until the lamb is old enough to consume all of the milk.

Disowned or orphaned lambs

The number of disowned lambs can be reduced by using claiming pens. These pens usually consist of two hinged four-foot panels. If the ewe and her lamb or lambs are kept in one of these claiming pens for a few days, it will give them a chance to get acquainted. When these pens are not used, the lambs are apt to wander away from the ewe and get lost and it may be difficult for the ewes to find them. At first the ewe recognizes her lamb by smell, but it is believed that she also recognizes the lamb by sight after it is several days old. Some shepherds believe that it helps if some of the milk is rubbed on the nose of the ewe and on the rump of the lamb. Usually there are few disowned lambs when the ewes are in good condition at lambing time and when they have an adequate milk supply. Well-fed ewes are heavier milkers and are more willing to accept their lambs than are thin ewes. The undernourished ewes are indifferent and do not stay with their lambs.

A patient shepherd seldom has much trouble to get a ewe which has

Figure 19. Claiming pen

The use of claiming pens like the one shown will cut down the number of disowned lambs. These pens should be 4 feet by 4 feet or 5 feet by 5 feet in size. They should be 3 feet or 3½ feet high. The 5 by 5-foot pen is better for large ewes.

lost a single lamb to adopt a lamb which may be a twin or triplet. Sometimes this ewe accepts the new lamb more quickly if the pelt of her dead lamb is fastened on the lamb to be adopted. This pelt should be removed after a few days. Another way to get a ewe to accept a strange lamb is to fasten the ewe in a small stanchion or to tie her with a halter so the lamb may nurse several times a day. The ewe, however, should not be tied or fastened in this manner without freeing her at least a couple of times a day for a short period. Some ewes will take the new lamb in two or three days, while it may require a week for others to accept it; occasionally a ewe never accepts an orphan lamb. It pays to go to much trouble to get a ewe to own an orphan lamb because this is easier and more satisfactory than raising it by hand. When they must be raised by hand, it is recommended that warm, rich, undiluted cows' milk be fed from a bottle with a nipple. The nipples known as "lambs' nipples" are the most satisfactory. Caution should be used to avoid overfeeding. If possible, the lamb should get the first milk from its dam or from another ewe that has just lambed. This first milk, or colostrum, has laxative properties and seems to protect the lamb against certain ailments. At first, the lamb should be fed only small amounts of milk at intervals of three to four hours but the amounts of milk per feeding and the length of time

between feedings may be increased as the lamb gets older. A little more than a quart of milk a day should be the maximum amount needed for the orphan lamb. Less than this should be given during the first week or two of its life. The lambs should be taught to eat grain and hay as early as possible. When the lamb is 3 or 4 weeks old, it may be necessary to slightly reduce for a few days the amount of milk fed to encourage grain and hay consumption.

Feeding the ewe after lambing

Ewes bred to lamb in warm weather in late April and in May or on pasture are easier to feed than those bred to lamb in the barn during winter or early spring. When the lambs are born in the barn, the ewe should be given all the hay she wishes. She is less likely to have a swollen udder or other udder trouble if the amount of grain offered is reduced considerably. The amount of grain given the ewe may be increased as the lambs grow and are able to handle all of the milk that is produced. Roots and silage, which usually stimulate the flow of milk, should be fed sparingly for the first few days after the lamb is born.

Many shepherds save some of their best legume hay to feed the ewes after lambing time. Such hay is more palatable, higher in protein content, and more satisfactory for supplying the feed needs of the milking ewes than are the lower grade hays. The ewe who is nursing a lamb needs a little more protein in her ration than the pregnant ewe, and this usually can be furnished most economically in the form of good legume hay.

How much grain and hay to feed

After the lambs are about ten days or two weeks old, the ewes should receive a liberal feed of grain or concentrates in addition to all the hay and roughage they will consume. Lambs make their most economical gains while nursing the ewes, and for this reason it pays to feed well at this time to increase milk production. Large, thin ewes raising twin lambs at least one month old may need as much as 1½ pounds of grain or concentrates daily in addition to a full feed of roughage, while fatter ewes with single lambs may not need more than one-half pound. Pregnant ewes a few weeks before lambing may eat only 3½ to 3¾ pounds of good quality legume hay in addition to some grain, but the same ewes also fed in dry lot three or four weeks after lambing may eat as much as 4½ pounds of the same kind of hay. Suggested rations for the ewe flock are given on pages 49 and 50.

Care of the Young Lambs

Creep Feeding

The lambs should be given access to feed in a creep if maximum growth is desired. A "creep" is an area that contains a hay rack and a low flat-bottomed grain trough. It is fenced off so the lambs have easy access to it but the ewes are unable to enter.

Photograph from H. E. Babcock

Figure 20. A grain trough for the lambs
The lambs should be given access to feed in a "creep" if maximum growth is desired. This group of lambs is being grown for the hot-house lamb market

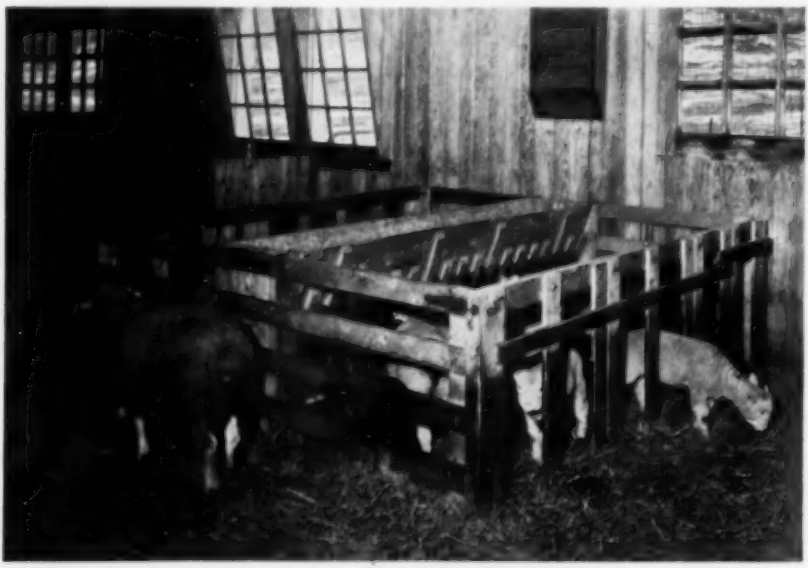


Figure 21. A lamb creep
A good "lamb creep" is adjustable and allows the lambs easy access to their feed supply

It may be difficult to build this to exclude all ewes, because small thin ewes may be able to enter the creep; but the extra feed which they eat is not wasted because usually such ewes need this feed. The grain trough should be constructed to prevent the lambs from getting into it and soiling the feed.

An excellent concentrate mixture for use in the creep consists of: 20 pounds of cracked corn, 20 pounds of whole or crushed oats, 20 pounds of wheat bran, and 10 pounds of linseed meal or pea-sized cake. After the lambs are four or five weeks old it is not necessary to grind or crush the grain except flint corn. A fresh supply of legume hay, such as alfalfa or clover of the very best quality, and a new supply of grain should be supplied once or twice daily. The feed not eaten by the lambs should be removed and may be fed to the ewes. The lambs may be given free access to grain and hay in the creep until they are about three or three-and-a-half months old. *A few lambs, especially those raised in dry lot, may become too fat, and some may die if too heavy feeding is continued after they are three months of age.* Lambs of this age usually eat some of the grain offered to the ewes and should be fed limited quantities of additional feed in the creep twice daily.

It is doubtful whether it pays to creep-feed lambs that are born within a month of the time they are to be turned out to pasture. Such lambs really will not learn to eat from a creep before leaving the barn and may not eat much grain after they are on pasture. Experience has shown that late lambs can be satisfactorily and economically grown without the use of creeps if the ewes and lambs have enough good-quality pasture. Creep feeding may, however, be helpful when pastures are short and when ewes are thin in flesh and are raising a large number of twins. Creep feeds for lambs are given on page 50. Some sheep producers say they have had trouble to get lambs to eat grain in a creep while on pasture even though they had used the creep while they were in the barn. A creep on pasture should be placed where the ewes and lambs spend most of their time. Sometimes the lambs may be taught to use the creep while on pasture if both the ewes and lambs are allowed to eat some grain in the creep for a week or so after they are first turned out in the spring. The lambs become accustomed to eating grain with the ewes and will continue to use the creep even after it has been equipped to exclude the ewes. Lambs on pasture have no need for hay in creeps.

Docking and Castrating

Some sheep owners say they get as much money for their undocked ram lambs as they do for their ewe lambs. If this is true, they are underpaid for their ewe lambs. A study of market quotations shows that long-tailed ram lambs may sell on central livestock markets at a discount of about $1 per 100 pounds. A thin wether usually finds a market as a feeder

lamb, but a thin ram lamb must be sold for meat.

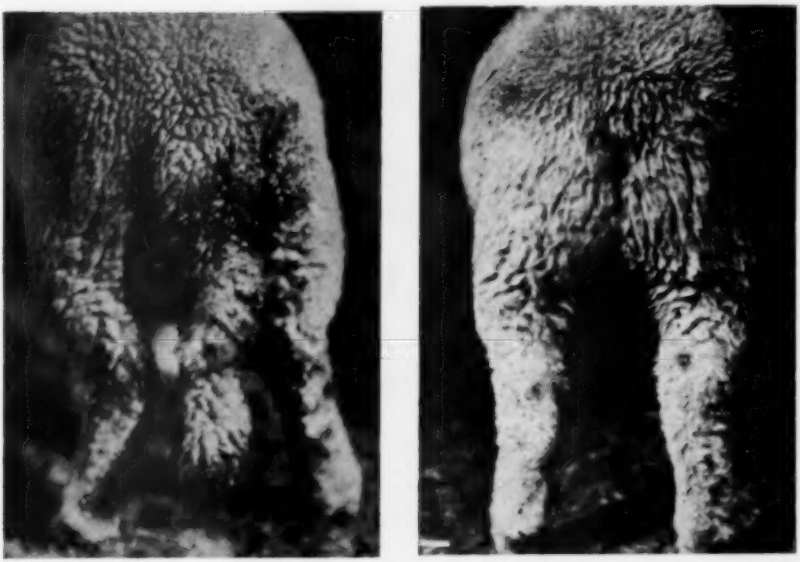
It is best to dock and castrate the lambs when they are from a few days to three weeks of age. The setback in growth and the amount of bleeding is less when the operations are performed while they are young. Both operations may be done at the same time or the lambs may be docked when a week or so old and then castrated ten days or a week later.

When the docking is to be done in the barn, it is best to have the pens freshly bedded before these operations are performed. All of the lambs to be trimmed should be placed in a temporary pen which may be made by using a hinged panel in a corner of the sheep pen. After these operations, the lambs are allowed to run with the ewes. When this method is employed, one avoids disturbing the lambs after they are trimmed.

The tails may be removed by the use of a knife, chisel, hatchet, docking irons, an emasculator, or an emasculatome. It makes little difference which tool is used so long as the tails are removed and the wounds heal rapidly. Experiments have shown that a cut heals faster than a burn. The sharp knife is an entirely satisfactory tool for the job. For

Figure 22. Docking the lamb

Experience has shown that it pays to remove the tails when the lambs are from one to two weeks of age



Photograph from Kansas Agricultural Experiment Station

Figure 23. An undocked (left) and a docked (right) lamb
Long tails gather dirt and serve no useful purpose

young lambs, the emasculatome gives better results than the hot docking irons. The tail should be cut from ½ to 1 inch from the body. Some persons who use the knife prefer to tie the tail tightly with binder twine before it is docked to reduce the loss of blood. This extra precaution is recommended especially for large lambs. The twine must be removed within two hours after the operation or a very sore and slow-healing dock will result. The twine should be wrapped around the tail twice before it is tied, and the operator should make sure that it is tied tightly. It is the opinion of the author that the lambs bleed more when this twine is not tightened enough than when not tied at all.

Castration is accomplished by cutting off the lower one-third of the scrotum after which the testicles are pulled out, one at a time. Some shepherds pull them with their teeth while others use their fingers or a pair of pliers. Certain bloodless castrating tools, emasculatomes, which are on the market, are especially desirable when the operations must be performed in hot weather when the flies are numerous. These tools also are satisfactory for castrating the larger, more mature ram lambs.

The special rubber-band method, or the elastrator method, is satisfactory for castrating and docking young lambs but should not be used in fly-time.

Figure 24. Castrating a lamb
Wether lambs produce more desirable carcasses than do ram lambs

Ailments of Young Lambs

Chilled Lambs

Chilled lambs are most common when the ewe flock is bred to lamb during cold weather, and particularly numerous if the lambs are weak at birth and if they are not dried soon after birth. These lambs die when not given immediate attention. Sometimes they may be revived by wrapping them in a warm woolen cloth after which they may be placed in a box or basket in which there has been placed a jug of warm water or a few hot bricks. Many chilled lambs have been revived also by taking them to a warm room. It is possible to revive chilled lambs by lowering all of their bodies except the neck and head into a pail of water that is as warm as one can comfortably stand with his bare arm. This method is claimed to be satisfactory, but has the objection that the lamb must be thoroughly dried after this treatment to prevent further chilling. The lamb should be fed as soon as it has been revived. He should not be kept away from his mother any longer than necessary. A few sheep breeders have used heat lamps and so-called brooders. The use of these heating bulbs is somewhat of a fire hazard.

Pinning

Occasionally the sticky fecal matter (dung) adheres to the wool about the tail and the anus and causes the tail to become "glued" to the body. This interferes with the normal passage of feces and may result in the death of the lamb if the shepherd does not come to its aid. This condition may be remedied if the tail is pulled free from the body and the fecal material scraped from the rear parts and the under side of the tail of the lamb. After the fecal material has been removed, it is sometimes wise to throw a small handful of dust or sand on these parts to prevent a repetition of this condition.

Constipation

If the lambs suffer from constipation, the condition may be relieved by administering one or two teaspoonsful of warm castor oil. Some shepherds prefer to inject either warm soapy water or a small quantity of mineral oil into the rectum and give a dose of about ¼ to ½ ounce of mineral oil by way of the mouth. One or 2 teaspoonsful of castor oil is a good laxative for young lambs.

Sore eyes

Sore eyes in lambs are manifested by the profuse flowing of tears. The eye may be treated with a saturated solution of boric acid, applied twice daily with an eye dropper. Other "eye washes" may be obtained from a veterinarian or from a druggist.

When lambs are suffering from "turned-in eyelids," which cause the eyelashes to rub against the eyeball, the condition may be improved by drying the eyelid and gently pressing on the eyelid in a manner which causes it to assume the normal position. If this is repeated often enough, the abnormal condition usually disappears. Experienced shepherds have found it desirable to take a stitch in the eyelid to cause it to remain in the correct position for a day or two, after which the stitch will come out or may be removed. This condition or defect seems most prevalent in the breeds that have an extreme covering of wool over the head and seems to be an inherited characteristic.

Navel ill

Navel ill is a disease which results from infections that usually gain entrance to the body through the navel cord. This disease is manifested by lameness or a swelling of one or more of the joints of the legs, such as the knee, hock, or stifle. This condition may usually be prevented by immersing the navel cord in tincture of iodine soon after birth.

Stiff lambs

The stiff-lamb disease is an ailment of young suckling lambs when they are from two to six weeks of age. Affected lambs have great difficulty in walking and seem somewhat paralyzed or "stiff" in front or rear legs or in both. This condition seems most prevalent in lambs that are born in March and April. The affected lambs do not seem to suffer any pain and

will suckle if helped to the udder of the ewe. Many stiff lambs die; others recover. Some flock owners believe their lambs are afflicted with this disease when they actually have navel ill.

The stiff-lamb disease has been studied for several years at the Cornell University Agricultural Experiment Station, where it has been shown that stiff lambs can be produced when the ewes are fed a mixture of oats, barley, and cull beans, and alfalfa or clover hay, or when they are fed cull beans and alfalfa hay. No stiff lambs have been produced by a ration consisting of oats, wheat bran, corn silage, and mixed hay. It seems quite certain that the disease is due, at least in part, to the ration offered to the ewe. The addition of unextracted wheat-germ meal (25 to 50 per cent by weight) offered in the lamb creep and one-half this amount added to the ration of the ewe has prevented this disease.

The results of experiments conducted by the author and his associates show that this disease may be prevented or cured by the administration of vitamin E. Mixed tocopherols and alpha tocopherol (vitamin E) are available in various concentrated forms, such as in oil solution, in capsules, in water soluble form, in tablets, or in the form of powder. Many New York farmers have cured stiff lambs by giving daily doses of 50 milligrams of mixed tocopherols or of 25 milligrams of alpha tocopherol until improvement was noted. The number of doses needed is variable, but the treatment is effective in curing the disease. These materials may be obtained at drug stores or from a veterinarian.

Sore mouth

Scabs or sores on the lips of lambs may give considerable trouble. Some cases may be cured by applications of tincture of iodine or a saturated solution of potassium permanganate to the affected parts. The scabs should be removed and the sores opened before the treatment is given. Some types of sore mouth may be prevented by vaccination, which should be done by a veterinarian. In severe outbreaks, the owner should get the services of a veterinarian.

There may be similar sores on the udder of the ewe that is nursing a lamb. These may be treated as suggested for sore mouth.

Spring and Summer Management

Pasture

Sheep hold an important place in the livestock kingdom today because of their ability to graze and to convert grass into meat. Grass is one of the cheapest and most satisfactory feeds that sheep may be offered. The producer of late-spring lambs is able to produce his lambs economically, because with healthy ewes and good, clean pastures he is able to market a large portion of his lamb crop as fat lambs shortly after weaning time. When poor or worm-infested pastures are used, or if the ewes are not

Figure 25. Ewes and lambs on fall-sown rye pasture

heavy milk producers, the lambs may require large amounts of grain after weaning time before they are fat enough to yield acceptable carcasses. Under such conditions creep feeding is recommended.

Good pasture should be provided as early in the spring as is practical. It is possible in some regions to grow fall-sown rye, wheat, or a mixture of rye and wheat, for use as early spring pastures for the flock. In some sections of the United States it is possible to graze such crops as fall-sown rye, wheat, or barley during the winter months. These crops also produce excellent yields of grain if they are not grazed too closely or too late in the spring. In fact, the wheat fields of Kansas and other Western States are used to fatten western lambs during the winter months.

Turning to pasture

At first, the ewe flock should be turned to pasture for only a short time, but this grazing period may be increased gradually until they may remain outside both day and night. It is best, at first, to see that the ewes and lambs have been filled with hay and other feed before turning them out. This precaution helps to prevent digestive disorders.

Many persons make the mistake of turning their sheep out on pasture

too early in the spring and forcing the ewes to obtain a living from grass that is not too plentiful and is too watery. One should, however, not make the mistake of turning them out too late in the spring after the grass has become coarse. Usually the grass grows much faster in the spring than the flock can eat it, but later in the season the grass may not grow fast enough to supply the needs of the flock.

Pasture management

Large pasture areas may be made more productive if they can be divided into two or more smaller areas which may be grazed at different times throughout the summer. When sheep are allowed to graze on one of these only two or three weeks at a time and then are moved to another lot, the sheep not only seem to get more feed from the pasture, but are less apt to become highly parasitized. A number of sheepmen find it a desirable practice also to mow the pastures, preferably before the grass goes to seed. Mowing the pastures in this manner provides a great deal more grazing area for the ewes than would be available if the tall dry grass were allowed to stand. On many farms it pays to improve pastures by top dressing them with ground limestone and phosphatic fertilizers. Applications of manure are desirable on many fields. To reduce possible trouble from internal parasites it is best to top dress pastures with well-rotted manure if sheep manure is used.

Temporary forage crops

Permanent pastures usually furnish an abundance of feed in May and June when the lambs are small, but they get short or dry in July and August when the lambs are larger and need more feed. If good temporary forage crops are available at this time, the lambs can retain their "baby fat" and, instead of losing flesh, will continue to gain so they will be ready for market with a minimum amount of grain. If the second growth in the meadows is not available, then such annual crops as sudan grass, dwarf Essex rape, broad-leaved rape, and thousand-headed kale may be used. Sown on fertile soil these furnish an abundance of forage at the time it is really needed.

Experiments have shown that lambs make greater gains when they have access to grass pasture in addition to such forage crops as rape. This is accomplished by sowing part of a meadow to rape, or the like, so the lambs may eat either grass or rape. Usually a crop of hay may be taken off the portion of the field not sown to rape or kale. The second growth in this hay field usually is well started when it is necessary to graze it and the rape. When it is not possible to offer both grass and rape, it is desirable to feed the lambs a small quantity of hay while they are grazing rape, as this practice seems to reduce the amount of scouring that is common to lambs that are grazed on rape alone.

From 8 to 10 pounds of rape or kale seed may be sown to the acre. These seeds may be sown separately or they may be mixed. Some shepherds prefer to sow a mixture of 1 bushel of oats and 7 or 8 pounds of rape, or a mixture of 1 bushel of oats, 1 bushel of Canadian field peas, and 6 pounds of rape to the acre. When such crops are sown about the middle of May, they will be ready in New York State for limited grazing in late June or early July.

Experiments at the Cornell University Agricultural Experiment Station show that thousand-headed kale does not provide forage as early as does rape but furnishes more feed later in the season. Broad-leaved rape has been shown to be a superior forage crop because it yields heavily throughout the grazing season. Dwarf Essex rape furnished decidedly less grazing than broad-leaved rape and a mixture of dwarf Essex rape, oats and peas yielded slightly less than dwarf Essex rape sown alone. Naturally, somewhat different results might be obtained if these crops were grown on a different type of soil.

Sudan grass sown in late May or early June on fertile soil has a heavy carrying capacity. Good seedings of alfalfa, clover, and grass may be obtained when sown with the sudan grass. Sudan grass seed may be sown at the rate of 30 to 35 pounds per acre.

Shade, salt, and phenothiazine

Usually, shade is easily and inexpensively furnished by trees in most permanent pastures. Where there are

Figure 26. A salt box for feeding phenothiazine and salt mixtures

no trees, some sort of artificial shade should be provided.

Most of the farm flocks in this country are not fed salt alone in summer but are given free access to a mixture of one part of phenothiazine and nine parts of salt, by weight. The salt may be the CC or similar grade, or fine salt may be used. The feeding of this mixture helps to keep internal parasites under control. It is best to locate the salt mixture either near the water supply or in a shaded area. It should be kept in a box that protects it from the rain but allows the sheep and lambs free access to it. The box should be built to prevent lambs from getting into the box and soiling the mixture.

It is recommended[3] that a mixture of 1 pound of phenothiazine to 7 pounds of salt be used if the owner prefers to salt the sheep only once a week. He should give the sheep what they will clean up in a few hours, but no additional salt should be given. A small amount of grain may be added to the mixture to get greater and more rapid consumption.

Weaning the Lambs

The age at which the lambs should be weaned varies from three-and-one-half to four-and-one-half or five months of age. Most lambs should be weaned when from four to four and one-half months old. There is no need to wean lambs before this if the ewes are milking well, the pastures are good, and both the ewes and lambs are in good condition. On the other hand, nothing is gained by prolonging the nursing period when the ewes are giving little milk and conditions are such that the lamb would gain faster if weaned and given better feed.

How to wean

It is best to separate the ewes from the lambs and not to allow them to be together again. The weaned lambs should be given the best pastures. If good pasture is not available, the lambs should be left on the old pasture to which they are accustomed for a few days before moving them to the feed lot or elsewhere. With purebred flocks, in which ram lambs are raised, it is best to separate the ram lambs from the ewe lambs soon after weaning to prevent them from breeding the more mature ewe lambs.

Feeding the Lambs after Weaning

The treatment of the lambs after weaning depends upon their size and condition, the availability of feeds, and the use to which the lambs will be put. Generally there is a demand for market lambs that are fat and weigh 70 pounds or more. In early spring the lighter lambs, if fat and of good type, sell at a premium. The lambs that do not carry enough size or finish to yield desirable carcasses should be grown and fattened as rapidly and economically as possible. Those that are to be saved for breed-

[3] *Phenothiazine for the Control of Livestock Parasites.* By A. O. Foster and F. D. Enzie. U. S. Dept. Agr., Agr. Res. Adm., Bur. An. Ind. Zool. Div., 1949.

ing purposes should be handled so their development will be uninterrupted.

In addition to the best forage crops or pastures that are available, it usually pays to feed the lambs some grain and concentrates after they are weaned. When temporary forage crops or leguminous crops are provided, such grains as corn, barley, oats, wheat, and the like are satisfactory. When poorer pastures have to be used, some protein supplements may be added. Several rations are suggested on pages 49 and 50. Usually from ½ to ¾ pound of grain or concentrates daily is enough for a lamb when good pasture is available. When the weaned lambs must be fed in dry lot, more grain is recommended and also a full feed of good-quality legume hay.

Too heavy feeding of grain

Sheepmen occasionally experience losses from "overeating disease" when lambs or sheep are fed too much grain. There may be losses when a large group of lambs of mixed sizes and ages are fed at the rate of a little more than 1 pound of grain or concentrates daily. This trouble would not occur if all lambs ate the same amount, but, as they are usually handled, some lambs may eat 2 pounds and others only ½ pound daily. These losses would be prevented, even when 1½ pounds or more grain is fed daily, if the lambs were divided into smaller groups according to size and age, and if enough trough space was provided.

Some lambs do not die but develop "sprung" shoulders and become stiff in the front legs or "founder" from too heavy feeding of grain. Experienced shepherds, however, know that there are thousands of underfed lambs in this country to each one that is over-fed.

One and one-half pounds of grain daily is considered a heavy rate of feeding for ewes that are given all they will eat of good-quality roughage. Few breeding ewes ever die from being over-fed. There is no danger of overfeeding ewes or lambs with roughage alone even though it is of excellent quality.

The Ewe Flock after Weaning

For a week or two after weaning it is best to provide rather scanty feed for the ewes to aid in checking the production of milk. Two or three days after weaning a little of the milk may be removed from the udders that seem to need it. This may be repeated in a few days or until there is no danger of ruining the udders. After this time, the ewes may be given the second-best pastures, the best being used by the lambs. Flock owners have found that dry ewes effectively clean up fence rows or lanes and otherwise utilize feed that ordinarily would be wasted on farms where no sheep are kept. Owners of "hot-house-lamb"-producing flocks usually slaughter the lambs when they are from six to ten weeks of age. The ewes raising such lambs are producing a heavy flow of milk and require more time to "dry off." This period can be shortened by withhold-

ding all grain and succulent feeds and by offering a poor grade of hay. After the flow of milk has ceased, the ewes should be kept gaining in condition but should not be fattened.

Culling the Flock

Weaning time gives the owner a good opportunity to mark the least productive ewes in the flock. The breeding and lambing records and also the wool and weaning-weight records should be used as a guide for culling. The least productive and the older ewes may be fattened and marketed before the winter feeding period. It is not difficult, at least in some areas of the State, to develop a good market for the mutton carcasses that are produced by these ewes. The cull ewes are excellent sources of meat for owners of freezer lockers or home freezer units.

Feeds for Sheep

Roughages

Hay

Good-quality legume hay, such as alfalfa, birdsfoot trefoil, alsike clover, red clover, ladino clover, and soybean hay, are excellent dry roughages for all classes of sheep. Sheep seem to prefer the leafy, fine-stemmed hay and waste less of it than the more mature or coarse and fibrous hays. Legume hay is palatable and is high in calcium, protein, and vitamins. In addition, it is somewhat laxative. When good legume hay is fed, little other protein-rich feed is needed in the ration.

Mixed clover and timothy, or alfalfa and timothy, *if cut early,* are desirable sheep hays. Mixed hays that contain a high proportion of legumes are preferred. Timothy hay is an inferior roughage for sheep; but when timothy hay is cut early, it is decidedly superior to that which is mature. The heads of mature timothy hay have a tendency to cling to the wool about the head and neck of the sheep.

Sheep are able to use to good advantage small amounts of such roughages as corn stover, corn fodder, millet hay, bean pods or bean straw, and oat or wheat straw. It is strongly recommended, however, that these inferior roughages be fed with good-quality legume hay. Usually these lower grade or carbonaceous roughages should not be fed more often than once daily, and legume hay should be given at the other feeding. Many New York breeders feed a little oat or wheat straw but usually not more than one or two feeds a week. When too high a proportion of carbonaceous roughage is fed, it may be necessary to supply a calcium supplement to the sheep or lambs. Such feeds as cornstalks are often most easily and satisfactorily fed by scattering them on high, dry, and frozen ground. Sometimes the ewes may be allowed to feed on cornstalks that are in the field after the grain has been harvested.

Succulent feeds

Such *succulent feeds* as *peavine silage, corn silage, other hay or grass silages,* cull potatoes, cabbage, mangels, turnips, carrots, pumpkins, and the like, are desirable additions to sheep rations. Breeding ewes are more easily kept in condition and fattening lambs do especially well when silage or other succulent feeds are included in the ration. It is dangerous to feed moldy or spoiled silage or damaged and decayed roots or cabbage to sheep. Careful shepherds sort out such moldy or decayed parts to prevent digestive disorders or even death. Frozen silage or roots are apt to cause "stretches" or belly ache. Cabbage that has been treated with poison during the growing period, as already stated, should have the outer leaves trimmed off. Some flock owners turn their ewes into the cabbage field after the cabbage heads are removed. Such waste feeds are excellent for the ewe flock in the fall.

Concentrates

Shelled corn is a good grain for feeder lambs and also for other classes of sheep when it is properly fed. Many flock owners hesitate to feed corn even though it has been proved to be a safe feed for ewes and young lambs when properly supplemented. The feeder should realize that corn is a highly concentrated feed and is heavy per unit of volume. Less trouble follows its use if fed by weight rather than by measure. One quart of shelled corn weighs 1.7 pounds; 1 quart of oats weighs 1 lb.

Hominy feed is equal to shelled corn as a feed for sheep or fattening lambs.

Barley is a good feed for all classes of sheep. For fattening lambs, barley is worth slightly less than shelled corn.

Oats are a popular feed for sheep of all ages and are one of the safest feeds. Oats are excellent to get fattening lambs on feed and are nearly foolproof as a feed for the ewe flock. They are somewhat less valuable than is corn for fattening lambs.

Wheat and rye are not commonly fed but are about equal to barley in feeding value. It is recommended that either of these be fed in a mixture with other grains or concentrates.

Cane or beet molasses may be safely fed at the rate of from ¼ to ⅔ pound a head daily to fattening lambs or to ewes. Molasses should be mixed with the concentrates or should be fed in the form of a broad ribbon in a flat-bottomed trough to prevent the soiling of the fleeces.

Dried beet pulp may be substituted for part of the grain and may be fed wet or dry.

Buckwheat may be fed in limited quantities with success.

Linseed meal is one of the most popular protein-rich concentrates for sheep and lambs. Pea-sized cake is relished by lambs and it is easier for them to pick it up than the meal.

Cotton seed meal, corn gluten meal, soybean oil meal, and **whole soybeans** may be substituted for the linseed meal used in the usual type of sheep rations.

Wheat bran, like oats, is a popular sheep feed. It is palatable and seems to have a desirable laxative effect. Wheat bran contains more phosphorus than other common sheep feeds, but contains only 13 per cent of digestible protein or less than one-half as much digestible protein as is contained in linseed meal.

Wheat germ meal is a popular feed with flock owners who wish to prevent the occurrence of the "stiff-lamb" disease. It may be fed to the ewes and the lambs the same as wheat bran is fed.

Dried brewers' grains and **distillers' corn dried grains** have proved, at the Cornell station, to be desirable feeds for fattening lambs. These feeds have been fed as protein supplements or as substitutes for one-third of the corn in rations for fattening lambs.

Cull beans, the split, cracked and discolored beans which are unsalable for human food, may be used as a feed for sheep or lambs. Liberal amounts may be fed to the ewe flock, but it is best to include not more than 50 per cent, by weight, of beans in the rations fed to fattening lambs. The value of cull beans is much improved when linseed meal is fed with them at the rate of 0.10 pound or more per sheep or lamb daily.

Preparation of Feeds

Probably it does not pay to chop or cut into short lengths good-quality hay that is to be fed in the usual type of rack used in New York. The results of a total of 23 trials which have been conducted at several western experiment stations indicate that the chopping of alfalfa hay for lambs increases its value 18 or 19 per cent. The average of three trials at the Cornell station shows that during a feeding period of 70 days' duration, the ewes fed the long hay made an average total gain of 4.89 pounds each, while similar ewes fed the chopped hay at the same time gained an average of 6.10 pounds each. The difference in favor of the chopped hay is too small to pay for the chopping of the first-cutting hay for such ewes. Both lots of pregnant ewes were fed silage and in two of the three trials also a small amount of grain.

It may pay to chop low-grade roughages, especially if large quantities are wasted when fed without any preparation. Shredding or chopping corn stover would avoid some waste and make it possible to feed it in the barn more easily. The cost of this preparation, however, may be too great.

Sheep seem to prefer whole grains, and probably nothing is gained by grinding them except for lambs under four or five weeks of age, or for very old sheep. However, finely chopped silage is preferred because sheep eat it with less waste.

Concentrate Mixtures for Sheep and Lambs

It is difficult to suggest a concentrate mixture for sheep or lambs that is suited to all conditions because of the wide variation in the kind of roughage fed on different farms, and also a great range in the amount of roughage eaten. For most classes of sheep, it is desirable and economical to feed rather liberally the home-grown roughages and to add enough concentrates to supply the needs for proper growth or fattening. The following concentrate mixtures are suggested. The mixtures suggested in **A, B, C,** and **D** are suitable for both pregnant ewes and for ewes that are nursing lambs. They are also suitable for the rams and lambs that are saved for replacement. When home-grown grain is not available, it may be economical to buy dairy feeds or other suitable livestock feeds for sheep.

A. For ewes fed good legume hay for roughage

1. Oats, or barley, or a mixture of these

2. Oats, 60 pounds; corn, 25 pounds; wheat bran, 15 pounds

3. Oats, 70 pounds; corn, 20 pounds; wheat bran, 10 pounds

4. Corn, 60 pounds; wheat bran, 40 pounds

5. Corn, 90 pounds; linseed meal, 10 pounds

B. For ewes fed good legume hay and silage* or roots

1. Oats or barley, 66 pounds; wheat bran, 34 pounds

2. Oats, 45 pounds; corn, 40 pounds; wheat bran, 10 pounds; linseed meal, 5 pounds

3. Oats, 45 pounds; corn, 45 pounds; linseed meal, 10 pounds

4. Corn, 60 pounds; wheat bran, 30 pounds; linseed meal, 10 pounds

*Corn silage or silages made from grass or pea-vines may be fed.

C. For ewes getting early-cut hay containing about 50 per cent of legumes and with or without a moderate amount of silage* or roots

1. Oats, 20 pounds; corn, 50 pounds; wheat bran, 20 pounds; linseed meal, 10 pounds

2. Corn, 60 pounds; wheat bran, 25 pounds; linseed meal, 15 pounds

3. Oats, 50 pounds; barley, 40 pounds; linseed meal, 10 pounds

4. Barley, 80 pounds; wheat bran, 10 pounds; linseed meal, 10 pounds

5. Oats, 50 pounds; corn, 20 pounds; wheat bran, 20 pounds; linseed meal, 10 pounds

*Corn silage or silages made from grass or pea-vines may be fed.

D. For ewes receiving early-cut hay containing only a small percentage of legumes

1. Oats, 30 pounds; corn, 30 pounds; wheat bran, 20 pounds; linseed meal, 20 pounds

2. Oats, 35 pounds; barley, 35 pounds; wheat bran, 10 pounds; linseed meal, 20 pounds

3. Oats, 20 pounds; corn, 20 pounds; linseed meal, 20 pounds

4. Barley, 55 pounds; wheat bran, 25 pounds; linseed meal, 20 pounds

5. Oats, 40 pounds; barley, 40 pounds; linseed meal, 20 pounds.

Concentrate mixtures that contain a high proportion of protein have been suggested in these rations when the hay is slightly leguminous. When protein-rich feeds are cheap and plentiful, probably no harm will be done even if more of these feeds are included in the rations.

E. Creep feeds for lambs in the barn which also have access to legume hay or for creeps on pasture

1. Oats, 20 pounds; corn, 20 pounds; wheat bran, 20 pounds; linseed meal, 10 pounds

2. Barley or corn, 30 pounds; oats, 20 pounds; linseed meal, 10 pounds

3. Oats, 75 pounds; wheat bran, 15 pounds; linseed meal, 10 pounds

4. Corn, oats, and barley; equal parts, by weight

The mixture 1 above is most highly recommended for dry lot. The wheat bran may be omitted from mixtures 1 and 3 if they are to be fed to lambs on pasture.

F. For lambs after weaning, intended for market, which have access to good pasture or good legume hay

1. Corn, barley or oats, or a mixture of these

2. Corn, 90 pounds; linseed meal, or soybean oil meal, 10 pounds

3. Corn, 80 pounds; dried brewers' grains or distillers' corn dried grains, 20 pounds

In the foregoing mixtures, cottonseed meal, soybean oil meal, or soybeans may be substituted for the linseed meal. When the price is favorable, such feeds as dried brewers' grains, distillers' corn dried grains, and corn gluten meal may be used as a source of protein.

Healthy Sheep

HEALTHY sheep return greater profits than unthrifty ones. Healthy lambs reach market weights at an earlier age, are fatter, and sell for a higher price than do unhealthy ones. Healthy ewes are better milkers, keep in higher condition, and live longer than do the ewes that are suffering from neglect, disease, or other unfavorable conditions. Healthy sheep make more efficient use of farm feeds than do unhealthy ones.

Parasite Control

External Parasites

The maggot fly

The areas of wool that are befouled with dung or urine, certain oily or gummy areas on fine-wool sheep, or open wounds attract the maggot fly. The eggs are laid in such areas and hatch in a short time. These larvae grow rapidly and eat into the skin of the sheep and cause much discomfort. The sheep tries to reach the affected part with its mouth and is restless. The treatment consists of killing the maggots with a solution of sheep dip and water, or with turpentine, chloroform, or commercial products for maggot control. After the maggots are killed, pine tar should be applied to prevent further attacks by this fly. Sheep that are kept free from dung locks and lambs that are castrated and docked early in the season experience little trouble from maggots.

Sheep ticks, lice, and scab

Sheep infested with these parasites usually spend a great deal of time biting, scratching, and rubbing themselves. This continued irritation which interferes with feeding reduces the efficiency and in many cases also lowers the vitality of the sheep, and its wool becomes soiled so that it is of lower value. One of the duties of a shepherd is to be on the lookout for symptoms and to use preventive measures.

The sheep tick is one of the most common external parasites of sheep in New York State. Also, many flocks are infested with sheep lice. In a few flocks, the sheep scab has caused trouble. Sheep ticks are reddish or gray-brown in color and are about one-fourth of an inch long, but sheep lice are very much smaller and are difficult to see with the naked eye. The sheep scab mite is even smaller than the sheep louse. Ticks are usually on the neck, breast, shoulders, and belly of the sheep. There are three kinds of lice—the sucking body louse, the foot louse, and the biting louse. These lice range from one-tenth to one-twentieth of an inch in length. The sucking and biting lice live on various parts of the body, while the foot louse usually lives on the legs below the true wool.

Treatments. Dipping the entire flock is the most satisfactory way to control ticks and lice. Dusting or spraying with high pressure has proved successful but is not so effective as dipping.

Experience has shown that one dipping with any one of several different materials gives excellent control. Benzene hexachloride (lindane), arsenical dips, toxaphene, DDT, and methoxychlor are the major materials used to control sheep ticks and lice. Benzene hexachloride (lindane) as a cold dip controls scab. Rotenone alone, or rotenone and sulfur, have been effective for ticks but not for lice control. All of these materials should be used according to manufacturer's directions.

It is best to keep the sheep and

lambs out of the old quarters for one month after dipping to prevent reinfection. It is safe to use the old quarters after all the manure has been removed and after they have been thoroughly cleaned and disinfected.

When to dip. A convenient time to dip sheep is in the spring after shearing. Ten days or two weeks should elapse after shearing to give time for cuts to heal, especially when arsenical dips are used. It takes much less dip when the fleeces are short. The sheep should be fed and watered, or at least watered within three to six hours before dipping so they will not be thirsty or hungry when dipped. In cool weather, they should be dipped early enough in the day to have time to dry before night. In hot weather, they should not be dipped when overheated. The directions on the container should be followed carefully when commercial dips are used.

Dipping equipment. There are a number of portable sheep dipping outfits in New York State. Advice concerning the availability of these outfits and about dipping in general may be obtained through the local County Agricultural Agent.

Internal Parasites

Probably the most common cause of unthriftiness in New York flocks today is the internal parasite. The external parasites, such as lice, ticks, and scab, take a heavy toll in some flocks, but these do not present so great a problem to New York sheepmen as do the internal parasites, especially stomach worms and tapeworms. One hears a great deal now and then about the damage done to sheep by dogs. The dog problem is serious for a few flock owners, but dog losses are minor as compared with losses from stomach and intestinal parasites. Practically all farm flocks are infected to a greater or lesser degree. Effects of these infections are usually noticeable during the latter part of the pasture season and also after the sheep come into winter quarters. The owner who does not treat his sheep for parasites is certain to lose sooner or later.

Control

The results of studies over a five-year period at Cornell University[4] indicate that under some conditions the worms may be satisfactorily controlled without regular drenching during the grazing season. It is necessary, however, to drench the ewes and lambs with a therapeutic dose of phenothiazine in the spring before going to pasture and again after they come into winter quarters. A mixture of 1 pound of phenothiazine and 9 pounds of salt, but no other salt, should be kept before the flock during the grazing season, and alternate grazing should be practiced when the flock are run on permanent pasture.

It is recommended that the entire flock be drenched with the combined copper sulfate and nicotine sulfate

[4] *Methods of Internal Parasite Control in Sheep and Lambs.* By J. P. Willman, D. W. Baker, and L. B. Embry. Jour. Amer. Vet. Med. Assoc. **117**: 136–138. 1950.

solution when small permanent pastures are used and when feed and other conditions are less favorable than they were in these tests[5]. The flock should be drenched as often as once a month during the grazing season with the combined sulfate treatment if it shows symptoms of being wormy. This solution is inexpensive and easy to administer and its use in summer may prove to be good insurance against losses from internal parasites.

Any deaths should be promptly investigated by a post-mortem examination to determine the cause and to learn the degree of parasitic infection.

Experience has shown that the use of large pasture areas, grazing sheep and cattle together, moving the flock from one pasture to another, draining wet areas, fertilizing and mowing the pastures, and the use of temporary forage crops reduce losses from internal parasites. The above practices, coupled with medicinal treatment, are essential for efficient lamb and wool production.

Further Suggestions

Trimming the Feet

The feet of most sheep should be examined and trimmed at least once yearly. The feet of the fine-wool breeds grow faster and may need trimming twice yearly. Careful trimming of the feet of lambs and yearlings helps to prevent the development of bad pasterns and crooked legs. After the sheep is set on its rump, the feet may be trimmed, either with the aid of ordinary pruning shears or a jack knife. It is convenient in some flocks to trim all feet at shearing time.

Flock Records

A few simple flock records help to take the guesswork out of the enterprise. It is desirable not only to identify each ewe and her lambs preferably with an ear tag, but also to keep simple records of production. Careful and efficient culling is not possible without the aid of the lambing record, weaning weight, and fleece records. These records also are of value when individuals from the lamb crop are to be selected to be saved for breeding purposes.

Good Shepherding

A good shepherd is kind, patient, regular, prompt, and has a keen observing eye. He never abuses a sheep, will sacrifice sleep and rest for his flock, and is on hand at feeding time. He is alert and quick to observe changes for better or worse in his flock. He enjoys his work, loves his sheep, and usually is amply rewarded in returns from the flock. The work of the shepherd is not especially heavy or tedious but is most fascinating and interesting. Hundreds of flock owners in this State spend many

[5]Instructions for mixing drenching materials, and general directions for giving sheep medicinal treatments are given in Cornell Extension Bulletin 407. *Controlling Internal Parasites of Sheep*. Further help may be obtained from the local veterinarian and from the New York State Veterinary College at Ithaca, New York.

A

B

C

hours in the sheep barn, not at actual work, but just to enjoy the sight of healthy, contented ewes or playful, bouncing lambs. One who understands sheep and enjoys working with them is almost certain of success with them.

Handling the Wool Clip

A NUMBER of clean and neatly tied fleeces present a pleasing picture to the flock owner. The wool buyer or manufacturer not only is favorably impressed by such a sight, but he is interested also in the condition of the wool, the presence or absence of foreign material, and the kind and amount of wool twine used.

The owners should take care when feeding hay during the winter months that the fleeces do not contain too much chaff, especially on the shoulders and neck.

It is best to shear the sheep when the fleeces are dry. The shearing should be done on a clean, dry shearing platform or wooden floor. The platform or floor should be kept clean.

If such a platform or floor is not available, a large canvas spread on the bedded sheep pen makes a suitable shearing floor.

Sheep waiting to be shorn should be penned where they will not get dirty or be able to bring dirt, sand, or straw with them to the shearing floor.

Figure 27. Shearing the sheep

A, The shearer removes the wool from the belly first; B, left hind leg and thigh; C, the next step is to open up the neck and shear the head.

Photographs from *The American Agriculturist*

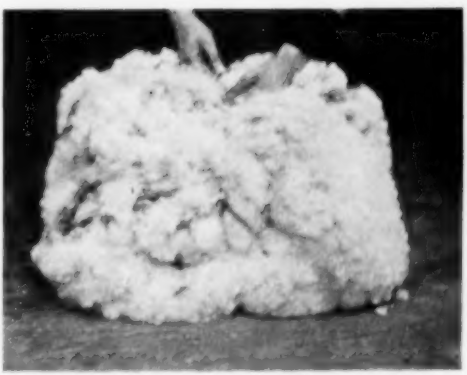
A good job of shearing consists of shearing the wool off evenly and close to the skin. Second cuts should be avoided because these produce short wool of less value than the longer fibers.

After the fleece has been removed, it should be spread out on a clean, dry floor or platform (not on a dirt floor) with the flesh side down. The sides of the fleece should be folded toward the center and then the fleece should be rolled by beginning at the breech end.

All dungy locks and dirty tags should be separated from the fleece and should be placed in a small burlap bag which may be put into the wool sack when the wool is sacked. The fleece should be tied with paper wool twine. Binder twine or heavy, rough, jute twines should not be used, because these shed loose fibers which do not take the dye and otherwise decrease the value

A

B



C

Figure 28. Shearing a Sheep

A, Finishing the job of shearing by removing the wool from the right side of the sheep. Notice that the fleece is intact and not scattered over the floor; B, the finished product—the ewe is smoothly shorn and free from cuts; C, this fleece has been properly rolled and is being tied with paper wool twine

Photographs from *The American Agriculturist*

of the finished cloth. One length of twine 8½ or 9 feet long is usually enough to tie the average-sized fleece. One pound of single-ply paper twine will tie 25 to 30 fleeces and a pound of four-ply paper twine will tie about 30 to 35 fleeces.

A useful publication on Wool Grading, Farmers' Bulletin 1805, may be obtained from the United States Department of Agriculture, Washington 25, D.C.

Revised April 1955

Published by the New York State College of Agriculture at Cornell University, Ithaca, New York. M. C. Bond, Director of Extension. This bulletin is published and distributed in furtherance of the purposes provided for in the Acts of Congress of May 8 and June 30, 1914.